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Original Research Article

Impact Analysis of Front Line Demonstration on Rice (*Oryza sativa L.)* The Yield, Economics and Farmer's Knowledge in Eastern Uttar Pradesh, India

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A B S T R A C T

Impact analysis of Front Line Demonstrations (FLD's) of rice on yield, economic returns, level of knowledge and adoption extent was conducted through study in Eastern Uttar Pradesh. Krishi Vigyan Kendra (ANDUAT), Mahrajganj has conducted Frontline Demonstration at adopted farmers' field in six blocks viz. Sadar, Siswa, Mithoora, Laxmipur. Ghughali and Nichlol of Mahrajganj, U.P. Cultivation of high yielding rice variety Swarna-Sub1 in which 110 participating farmer respondents and 110 non-participating farmer respondents from 10 representative villages were selected through stratified random sampling method for the purpose. Based on the data collected during 2017-18 to 2018-19 and the interviews with the two categories of farmers. The result of present study revealed that average highest yield in demonstration was recorded 57.07 q/ha was obtained in demonstrated plot over farmers practice (51.80 q/ha) with an additional yield of 5.27 q/ha and the increasing the average rice productivity by 10.14 percent. The extension gap and technology gap average 5.27 & 3.49 q/ha, respectively, with the technology index of 5.82 percent during the demonstration years. Besides this, the demonstrated plots gave higher gross return Rs. 93312 compared to farmers practice Rs. 88,060/ha., net return of Rs. 60,112/ha. it is high to farmers practice with higher benefit cost ratio 2.87 when compared to farmer's practice. In present study efforts were also made to study the impact of FLD on horizontal spread which was increased 48.57%, if appropriate package and practices are followed.

Keywords

Front Line, Rice, BCR, Economics, Horizontal spread and Yield

Introduction

Rice is indeed one of the oldest types of cereal recorded in the history of mankind. The cultivation of rice in intensive subsistence agriculture becomes synonymous with agriculture. India is the second largest producer of rice in the world being superseded only by China in the gross annual output. Rice is the major cereal crop of India. About half of Indian population survives on this cereal. Cultivated under diverse agro-climatic conditions, this crop covers about 4I M ha with production of 65 M T. By turn of this century, to sustain and exist as a nation, India must produce 97 MT of rice (Nat. Comm. Agriculture. 1976). Our major concern in coming years is to increase the productivity from 1.69 to 3.04 t/ha and to stablise this level. The similar findings are supported by (Reddy and Patil 1998) who revealed that the improved technology tested

on farmer's fields under the project of front line demonstrations. Frontline demonstration programme was effective in changing attitude, skill and knowledge of improved practices of HYV of urd including adoption this also improved the relationship between farmers and scientist and built confidence between them. Kirar *et al.,* (2006), shows the distribution of beneficiaries according to their change of area after conducting the FLD on their field (Verma, 2013). Frontline demonstrations have been used by the extension agencies as the effective tool for adoption and horizontal expansion of scientific technologies in order to fill the yield gaps which may exist due to the lack of awareness among the farming community regarding improved cultivation practices (Singha and Baruah, 2011). Such technology demonstrations may include high yielding/hybrid varieties, production, protection or management practices in the farmer's field under different agro-climatic regions and farming situations. The assessment of impact of these frontline demonstrations is equally important, as carried out by Sagar and Ganesh (2003), in case of kharif rice, Yadav *et al.,* (2004) in case of sunflower, Singh *et al.,* (2007) in case of mustard, Mishra *et al.,* (2009) in case of potato, Lathwal (2010) in case of blackgram and Raj *et al.,* (2013) in case of pulses.

Materials and Methods

Front-Line Demonstration is the new concept of field demonstration evolved by the Indian Council of Agricultural Research with the inception of the Technology Mission on Crops during mid-eighties. The field demonstrations conducted under the close supervision of scientists of the National Agriculture Research System are called front-line demonstrations because the technologies are demonstrated for the first time by the scientists themselves before being fed into the main extension system of the State Department of Agriculture. The present study was carried out by Krishi Vigyan Kendra Maharajganj, Achrya Narendra Dev University of Agriculture and Technology, Kumarganj, Ayodhya for three consecutive years from 2017-18 to 2019-20 of three years in the farmers field in six blocks viz. Sadar, Siswa, Mithoora, Laxmipur. Ghughali and Nichlol of Mahrajganj district through front line demonstration. Front Line Demonstration is one such powerful tool for transfer of technology which practically exhibits the strength of new technologies in increasing yield and profit. Total 110 demonstrations were conducted in different villages viz. Goniriya Babu, Gopala, Parsa Gidghi, Karauta,Devrua, Samerdhira, Khutwa Maidan, Paikoli and Parsouli Basantpur of 75 farmer's on 28.0 ha lands. Each frontline demonstration was laid out on 0.2 ha area while adjacent 0.2 ha was considered as control for comparison (farmer's practice). The selection of farmers was done on basis of survey by KVK and special training was organized for selected farmers on rice cultivation. The difference between the demonstration package and existing farmers practice are mentioned in Table 1. The crop was harvested at maturity stage. From front line demonstration plots and farmers practice plot (control plot) and finally extension gap, technology gap, and technology index were calculated as given as formula suggested by Samui *et al.,* (2000) and Dayanand *et al.,* (2012) as given below.

1. % increase over farmers practices = Improved practices – Farmers practices / farmers practices x 100
2. Technology gap = Potential yield – Demonstration yield
3. Extension gap = Demonstration yield – farmers yield
4. Technology index = [(Potential yield – Demonstration yield) /Potential yield] x 100

The data of adoption and horizontal spread of technologies were collected from the farmers with the interaction them. Data were subjected to suitable statistical methods. The following formulae were used to assess the impact on different parameters of rice crop.

1. Impact of yield = Yield of demonstration plot- yield of control plot/Yield of control plot X 100
2. Impact on adoption (% change) = No. of adopters after demonstration- No. of adopters before demonstration /No. of adopters before demonstration X 100
3. Impact on horizontal Spread (% change) = After area (ha) - Before area (ha)

Results and Discussion

Yield

The perusal of data (Table 2) indicate that due to front line demonstration on rice was average yield of 57.05 q/ ha was obtained under demonstration plots as compared to 51.80 q /ha in farmers practice. The average yield of rice is increased by 10.74 percent. The yield of rice could be increased over the yield obtained under farmers practices (lack of knowledge on use of bio fertilizers, no use of the balanced dose of fertilizer) of rice cultivation. However variations in the yield of rice in different years might be due to the variations in soil moisture availability, rainfall.

Extension gap

Extension gap on an average extension gap under three year FLD programme was 5.27 q/ha. This emphasized the need to educate the farmers through various techniques for the adoption of improved agricultural production technologies to reverse this trend of wide extension gap.

Technology gap

The technology gap, the differences between potential yield and yield of demonstration plots was average 3.49 q /ha during 2017-18to 2019-20 respectively. Hence, location specific recommendations are necessary to bridge these gaps. These findings are similar to (Singh *et al.*, 2011) and (Sharma and Sharma 2004).

Technology index

The technology index shows the feasibility of the demonstrated technology at the farmer's field. The technology index 5.82 which shows the effectiveness of technical interventions.

Economic returns

The economic viability of improved demonstrated technology over farmers practice was calculated depending on prevailing price of inputs and outputs cost and represented in the term of B:C ratio (Table 4). It was found that the cost of production of rice under demonstration with an average Rs. 32500. The additional cost increased in demonstration was mainly due to more cost involved in balanced fertilizer, procurement of improved seed. The cultivation of rice under improved technologies gave average net return of Rs. 93,312/ha which was lower 88,060 in farmer's practices. The benefit cost ratio of rice with an average of 2.87 in demonstration plots and farmers practice of 2.83 presented in table-3

Adoption of rice technologies

The result of improved technology intervention brought out that adoption of recommended new variety of rice by farmers before demonstration was negligible, which

increased by 19.5% after demonstration. Weedicide technique was increased by 400 % due to intervention through FLD. The overall adoption level of rice production technology was increased by about 204.56 percent (Table 4).

Table.1 Level of use and gap in adoption of rice technologies in Mahrajganj

Crop operation	Recommended technologies	Existing technologies	Gap
Variety	Swarna-Sub 1	Swarna	Partial gap
Land preparation	Ploughing and Harrowing	Ploughing and Harrowing	Nill
Nursery Swoing	30g/$m^{2\ of}$ rice seed	100g/m^2 of rice seed	High seed rate Full gap
Seed treated	thiram @ 1.5 to 2 g / kg seed, 3 g thiram/kg + 3 g carbendazim/kg seed.	No use of fungicides for seed treatment	Full gap
Transplanting method	Line transplanting distance Row to Row 20 cm and Plant to Plant 15 cm	Randomly transplanting, distance Row to Row 25 cm and Plant to Plant 20 cm	Partial gap
Fertilizer dose	120 kg N + 60kg P_2O_5 + 60 kg K_2O + 20 kg /ha $ZnSO_4$	150:30: N:P	Partial gap
Weedicide dose	Nomini Gold 100g/acre after 25 days transplanting.	Hand weeding/rarely used	Partial gap

Table.2 Yield and gap analysis of FLD on rice at farmers' field

Year	No. of FLD	Area (ha)	Plant Height		Panicle./m2		Potential Yield	Grain Yield t/ha		Grain Yield increase over FP	Extension gap (t/ha)	Technology gap (t/ha)	Technology index
			IP	FP	IP	FP		IP	FP				
2017-18	33	11.00	82	125	333	289	60.00	55.40	49.50	11.91	5.90	4.60	7.67
2018-19	37	13.00	88	139	319	274	60.00	56.63	51.50	9.96	5.13	3.37	5.62
2019-20	40	15.00	95	147	352	310	60.00	57.50	52.10	10.36	5.40	2.50	4.17
Mean	110	28.00	91.5	143	335.5	292	60.00	57.07	51.80	10.74	5.27	3.49	5.82

Table.3 Economic analysis of front line demonstrations on rice at farmers field

Year	No of Demonstrations	Yield q/ha.		Sale price of grain (MSP) (Rs./qt)	Gross expenditure (Rs./ha)		Gross returns (Rs./ha)		Extra returns (Rs./ha)		Incremental Benefit: Cost ratio	
		IP	FP		IP	FP	IP	FP	IP	FP	IP	FP
2017-18	33	55.40	49.50	1550	28200	26800	85870	76725	57670	49925	3.05	2.86
2018-19	37	56.63	51.50	1650	31400	30200	93440	84975	62040	54775	2.98	2.81
2019-20	40	57.50	52.10	1750	33600	32125	100625	91175	67025	59050	2.99	2.84
Mean	**110**	**57.07**	**51.80**	**1700**	**32500**	**31163**	**93312**	**88060**	**60812**	**56898**	**2.87**	**2.83**

Table.4 Impact of (FLDs) on adoption of rice production technology

Crop operation	Numbers of adopters Impact		Change in No. of adopter	(% Change) After demonstration
	Before demonstration	After demonstration		
Variety	105	125	20	19.05
Land preparation	120	130	10	8.33
Seed rate nursury	32	123	91	284.38
Seed treated	50	109	59	118.00
Fertilizer dose	23	115	92	400.00
Weedicide	22	110	88	400.00
Mean	59	119	60	204.96

Table.5 Impact of (FLDs) on horizontal spread of rice

Variety	Area (ha.)			
	Before demonstration	After demonstration	Change in area (ha)	Impact (% Change)
Swarna-Sub 1	175	303	128	48.57

FLD on horizontal spread of rice

The FLD produced a significant positive result and provided an opportunity to demonstrate the productivity potential and profitability of the latest technology (intervention) under real farming situation. Therefore the study concludes that FLDs conducted by KVK, Mahrajganj made significant impact on horizontal spread of this technology 48.57% (Table 5).

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